Water Quality Monitoring & Urban Runoff BMP

Treatment Effectiveness in Santa Monica

Neal Shapiro

City of Santa Monica

NPS 08, May 5-6, San Diego

City of Santa Monica

Sustainable Santa Monica

Water Quality Monitoring & Urban Runoff BMP

Treatment Effectiveness in Santa Monica

City of Santa Monica

Sustainable City Plan
Santa Monica

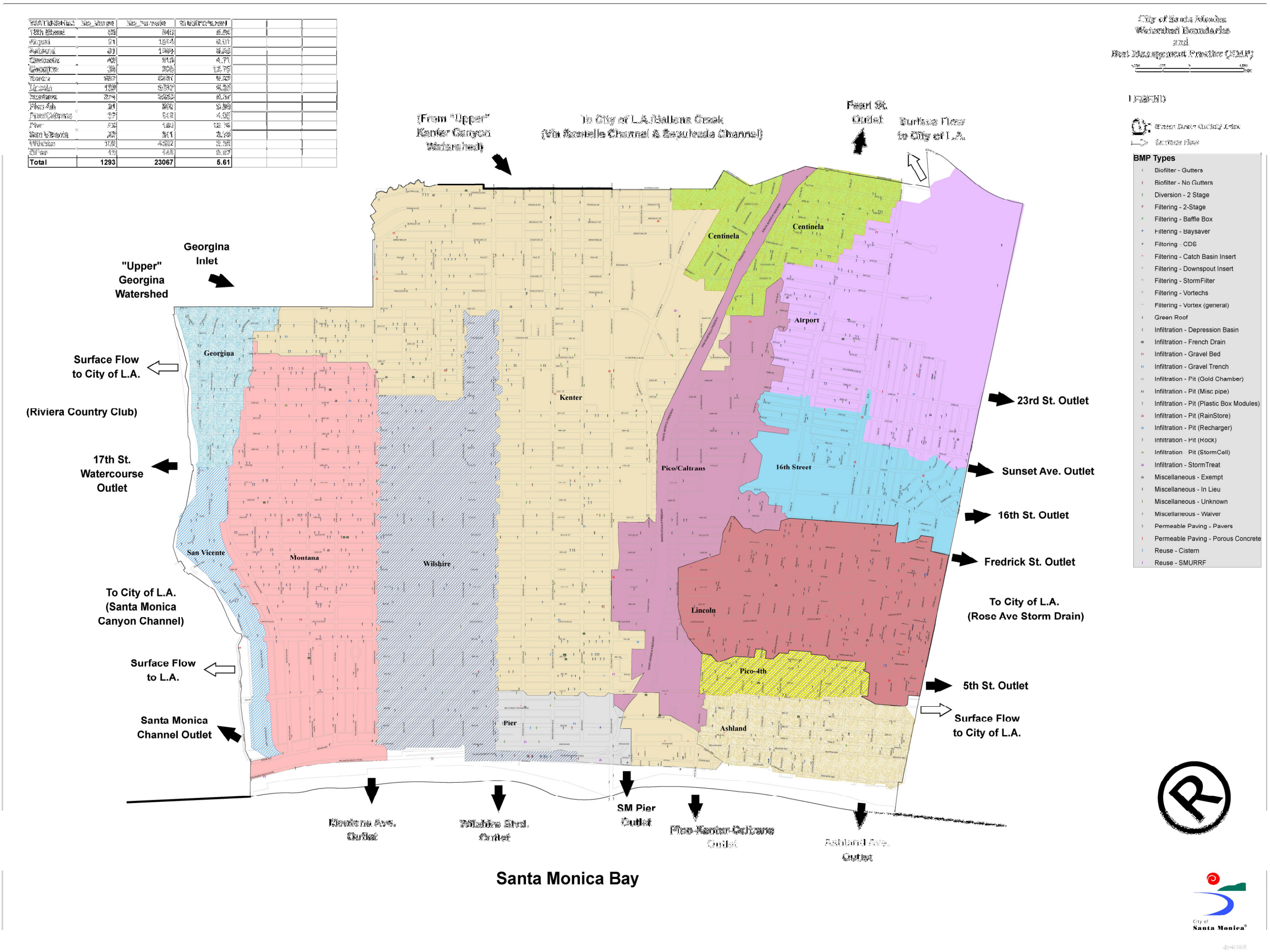
Projects in this Presentation

- Centinela Sub-Watershed, Westside Water Quality Improvement Project - SAC
- Montana Sub-Watershed, Montana Dry-Wet Weather Runoff Treatment Project
- Wilshire Sub-Watershed, Wilshire Dry-Wet Weather Runoff Treatment Project

City of Santa Monica

Concerns Today Preserved Tomorrow Santa Monica

Overall City Watershed & BMPs

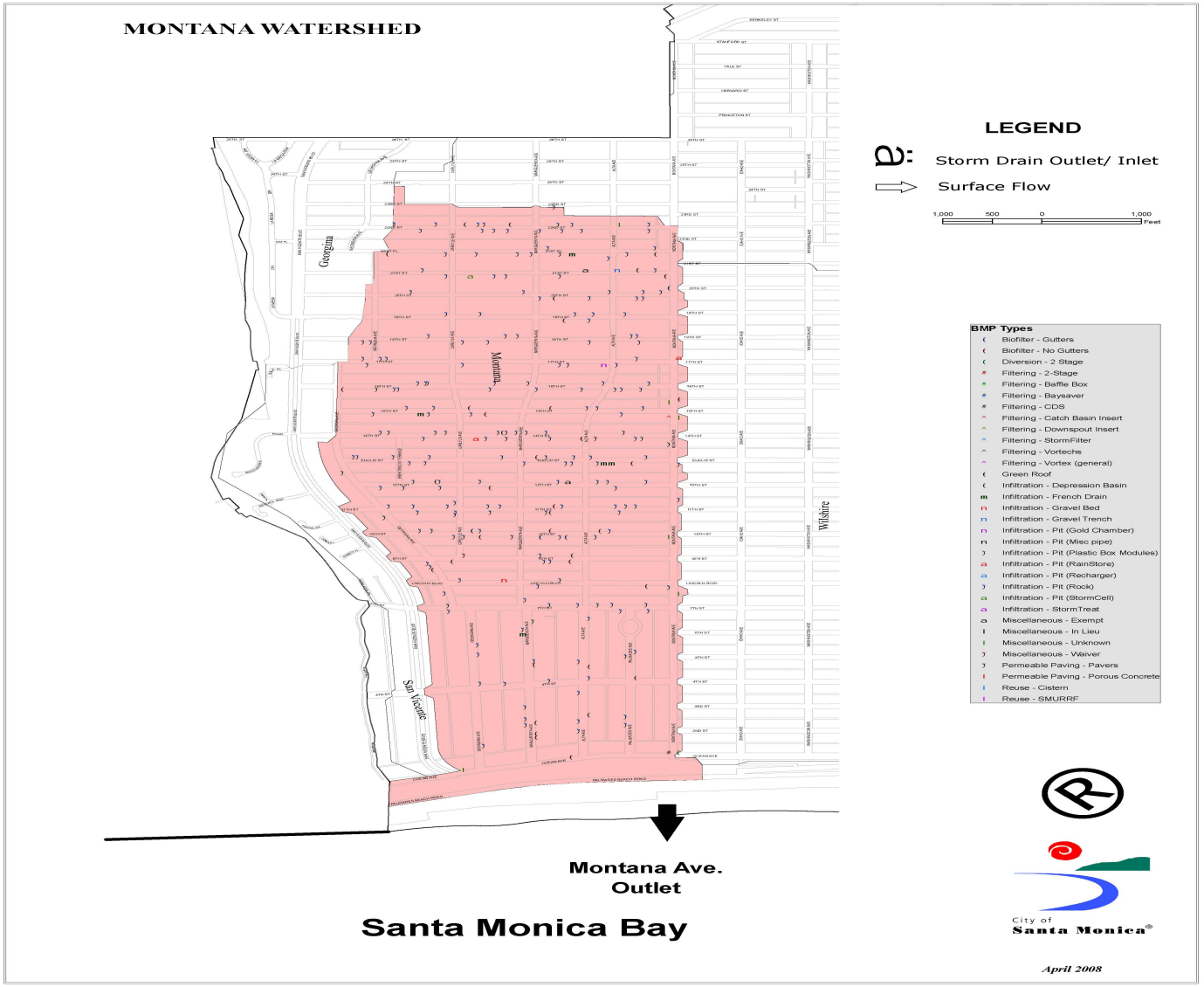


Centinela Sub-Watershed

City of Santa Monica

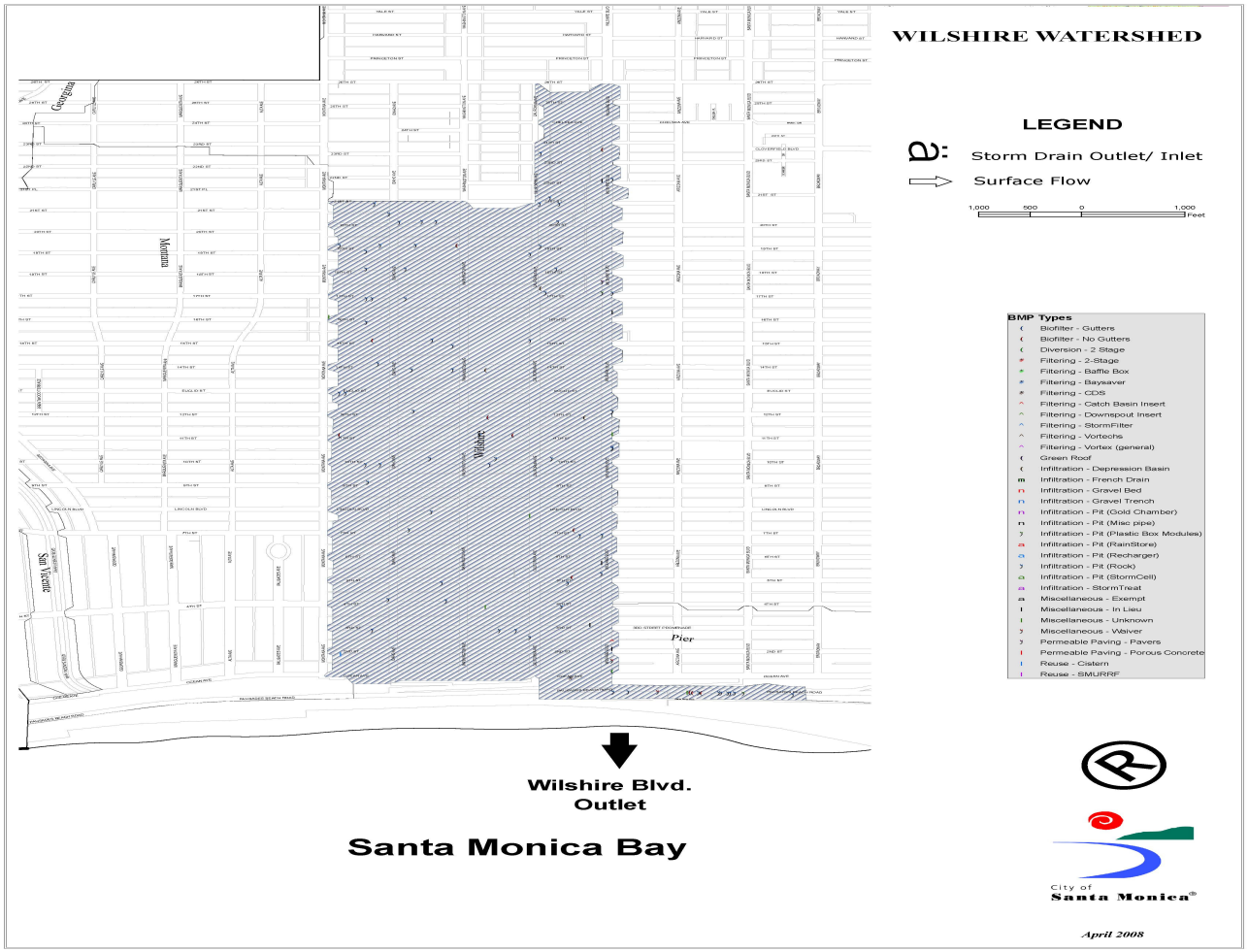
Sustainable Santa Monica

Montana Sub-Watershed



City of
Santa Monica

Wilshire Sub-Watershed



City of Santa Monica

Sustainable Santa Monica

Projects Funding Sources & Partners

- California Integrated Waste Management Board
- State Water Resources Control Board
  Propositions 12, 13, 40
- Los Angeles Regional Water Control Board
- State Coastal Conservancy (Prop 12)
- Los Angeles County Public Works
- City of Santa Monica

City of Santa Monica

Conserve Today
Preserve Tomorrow
Santa Monica

Project Funding - Centinela

$1.85 million grants for design, permitting and construction

Sources: Combination of California State Propositions 12 and 13 and State Integrated Waste Management Board Grants

+ City of Santa Monica matching funds

= $2.0 million total project budget

Project Funding - Montana

$1.76 million for design, permitting and construction

Source: Combination of California State Propositions 13 and 40 Grants, LA County Public Works

+ City of Santa Monica matching funds

= $2.63 million total project budget

Project Funding - Wilshire

$1.68 million for design, permitting and construction

Sources: Combination of California State Propositions 12 and 40 Grants, LA County Public Works

+ City of Santa Monica matching funds

= $2.57 million total project budget

Urban Runoff Mitigation Goal

Generic Project Objective:

Design and construct a state-of-the-art stormwater quality improvement treatment system for direct use or infiltration capable of treating all dry weather flow and wet weather flows (up to 80% runoff volume or the volume from the design storm event of 0.75 inches in 24 hours from a drainage basin, whether a private micro-watershed or a public sub-watershed of the overall City watershed.

City of Santa Monica

Concerns Today Preserved Tomorrow Santa Monica

Design Objectives

- Treatment systems shall be commercially available with a proven track record – no prototypes or unproven designs
- No (minimal) moving parts or chemical additives
- No (minimal) electrical power for treatment system
- Select treatment systems on basis of "best fit" for site hydraulic conditions and lowest life cycle (purchase and installation and annual O&M) cost

City of Santa Monica

Sustainable Santa Monica

Ideal BMP Site

- No or minimal Utility Conflicts
- No or minimal Traffic Construction Impacts
- Acceptable Hydraulic Head Available
- Flow to be Diverted from main storm drain
- Site in City of Santa Monica or close by outside the City

Project Stormwater Treatment Objectives

(discharge/non-direct use)

- Screening / Sedimentation to remove suspended sediment and all floatable trash larger than 1/8-inch in diameter from wet weather flows.
- Filtration to remove oil and grease, heavy metals, pesticides, and herbicides from all dry weather flow.
- Infiltration or Discharge

City of Santa Monica

Concerns Today. Preserved Tomorrow. Santa Monica

Project Stormwater Treatment Objectives

(direct use)

- Screening / Sedimentation to remove suspended sediment and all floatable trash larger than 1/8-inch in diameter from wet weather flows.
- Filtration to remove oil and grease, heavy metals, pesticides, and herbicides from all dry weather flow.
- Landscape Irrigation (sub-surface)
- Indoor Flushing

City of Santa Monica

Conserve Today Preserve Tomorrow Santa Monica

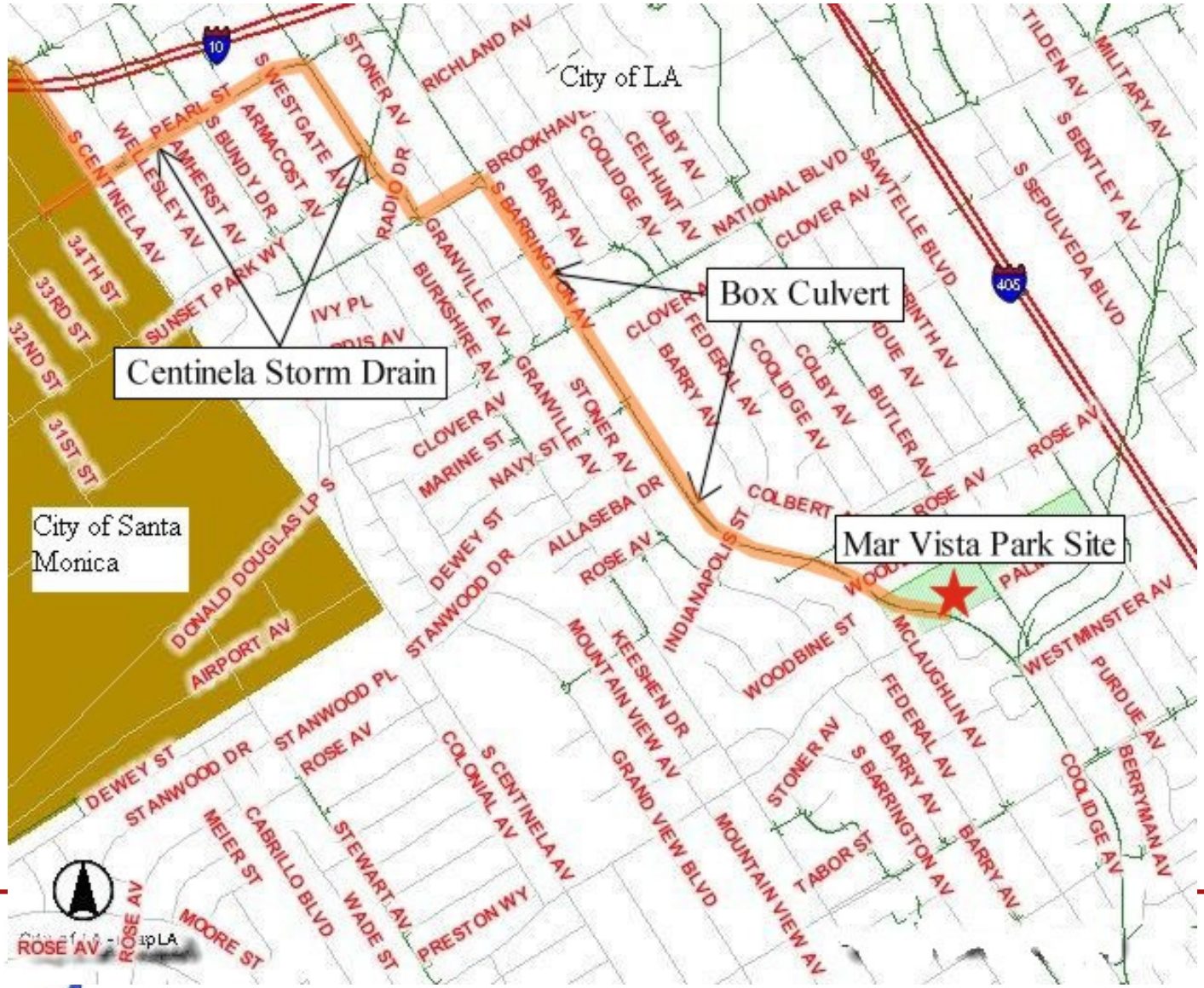
Treatment System Selection Criteria

- "Off the Shelf" System
- Verifiable Treatment Claims
- Must be Able to Function Under Available Limited Hydraulic Head
- Lowest Life Cycle Cost

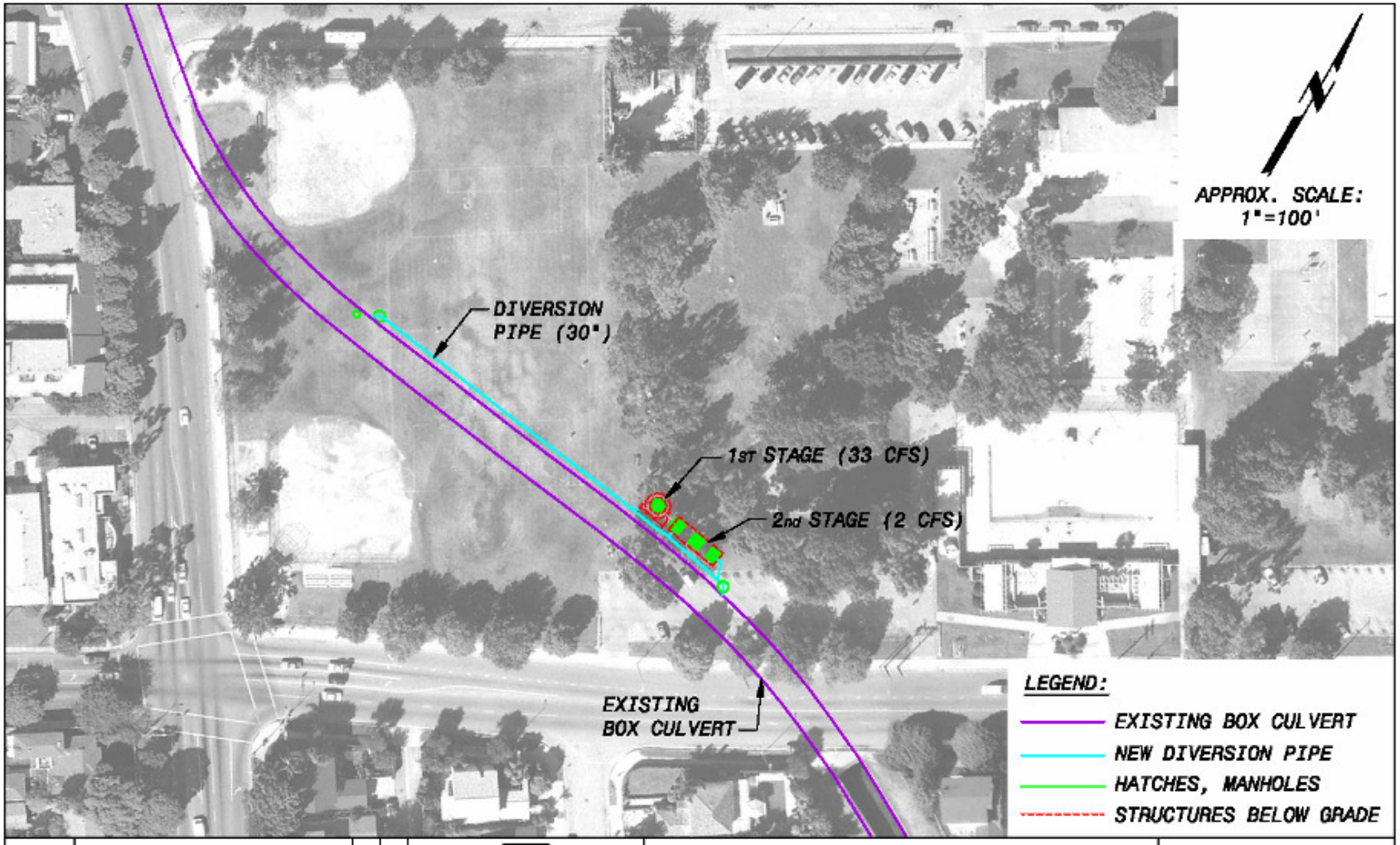
Treatment Train Evaluation Process

- Evaluated 7 Devices for High Flow Treatment
- Evaluated 5 devices for Dry Weather Flow Treatment

Westside Water Quality Treatment Project



Westside Water Quality Treatment Project



DATE	REVISION OR ISSUE	NO	BY

BLACK & VEATCH Corporation
136411

CENTINELA AVENUE STORM DRAIN TREATMENT

MAR VISTA PARK INSTALLATION SCHEMATIC

FIGURE
1

Westside Water Quality Treatment Project

Specific Project Objective:

Design and construct a large state-of-the-art urban runoff treatment system capable of treating all dry weather flow (2 cfs) and wet weather stormwater runoff for the design storm event (0.75 inches in 24 hours = 33 cfs) from the 330 acre Centinela sub-watershed in the City of Santa Monica.

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Project Schedule

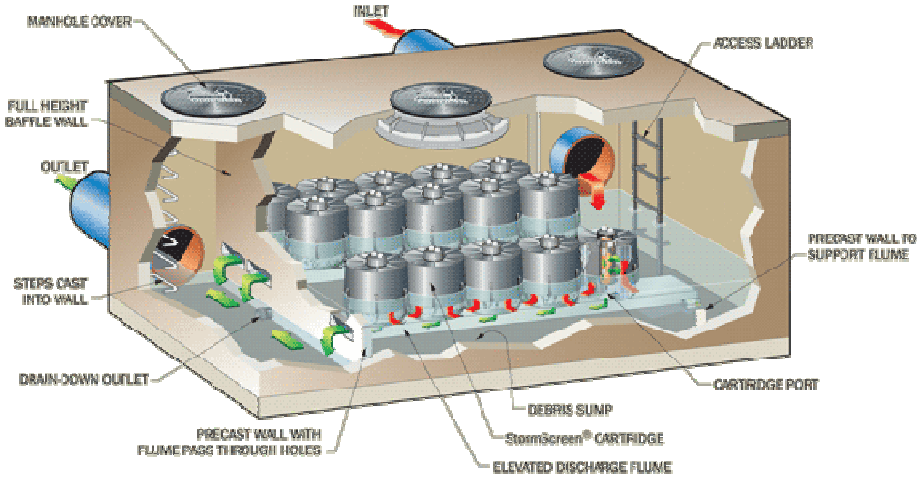
Grant Competition	2001 - 2002
Feasibility Study	Late 2003 – Early 2004
Design Phase	July 19, 2004 – Feb. 28, 2005
Permitting Phase	March 1, 2005 – June 30, 2005
Advertise for Bids	July 21, 2005 – August 18, 2005
Construction Phase	April – August 2006
Project Closeout/In Service	September 1, 2006

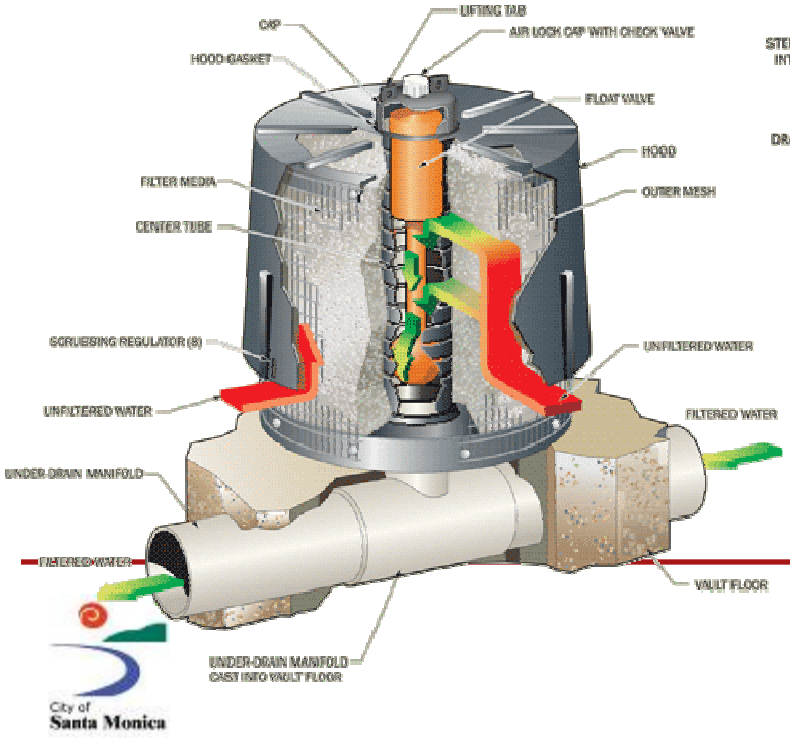
City of Santa Monica

Preserve Tomorrow Santa Monica

Dry Weather Flow Treatment System

Dry Weather Treatment System Selected: CONTECH StormFilter™



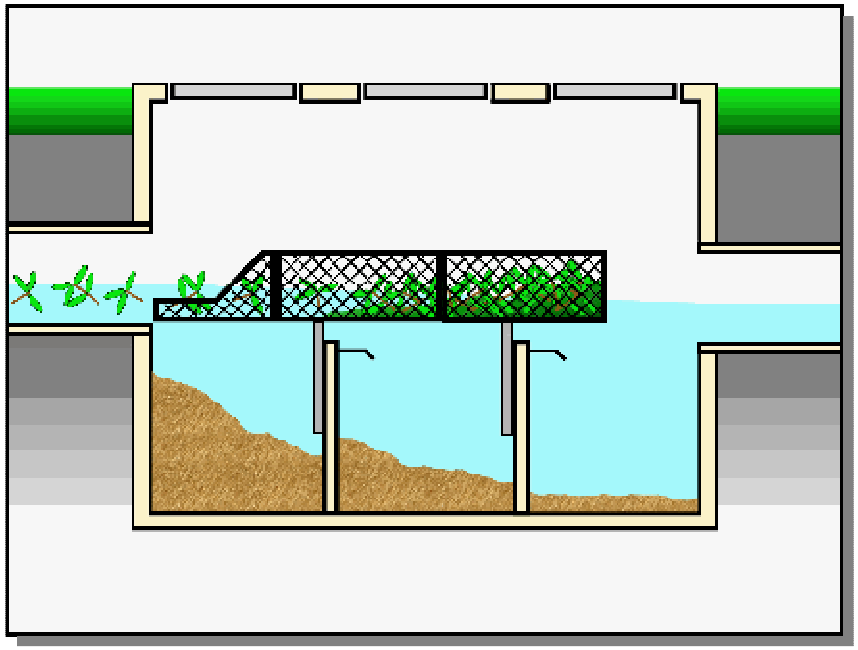


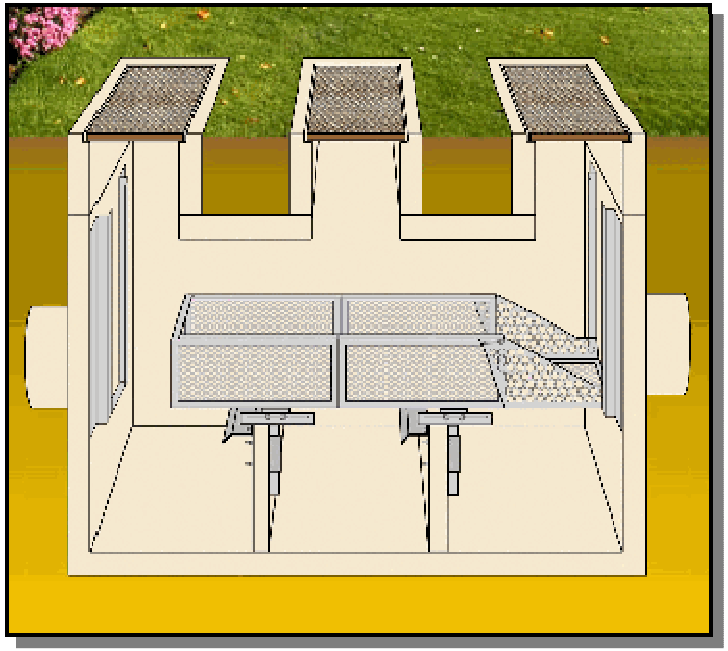
City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Wet Weather Treatment System

BioClean Environmental Services Baffle Box™





Mar Vista Park Site Challenges

City of
Santa Monica

Mar Vista Park Site Challenge

City of
Santa Monica

Preserve Tomorrow
Santa Monica
A Sustainable Community

City of
Santa Monica


9. 28. 2006

Water Quality Monitoring Results


7. 28. 2007


7. 28. 2007

Parameter Analyzed: Lead ug/L							
					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	ND	17.2	0.335	ND	21.7	-630	2.13
Outflow Conc	ND	0.585	0.185	ND	14.2	.665	ND
Change	----	-96.6%	-44.8%	----	-34.6%	+5.5%	≅100%

$$\% \ Change = 1 - \left(\frac{Outflow\,Conc}{Inflow\,Conc} \right) \times 100$$

Parameter Analyzed: Copper ug/L							
					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	5.60	40.50	7.10	0.23	118.0	13.8	22.0
Outflow Conc	5.20	13.00	0.715	ND	83.0	8.65	1.06
Change	-7.1%	-67.9%	-89.9%	≅100%	-29.7%	-37.3%	-95.2%

$$\% \ Change = 1 - \left(\frac{Outflow\ Conc}{Inflow\ Conc} \right) \times 100$$

Parameter Analyzed: Zinc ug/L							
					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	118	63.5	31.3	20.0	482	94.0	154
Outflow Conc	34.0	29.3	10.2	15.2	348	90.5	59.5
Change	-71.1%	-53.8%	-67.4%	-24%	-27.8%	-3.7%	-61.4%

$$\% \ Change = 1 - \left(\frac{Outflow \ Conc}{Inflow \ Conc} \right) \times 100$$

Parameter Analyzed: Arsenic ug/L							
					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	2.35	3.23	3.02	3.34	0.315	3.07	12.5
Outflow Conc	1.71	2.21	2.68	1.29	0.310	1.85	11.6
Change	-27.2%	-31.5%	-11.2%	-61.3%	-1.6%	-39.7%	-7.2%

$$\%\ Change = 1 - \left(\frac{Outflow\,Conc}{Inflow\,Conc} \right) \times 100$$

Parameter Analyzed: Turbidity, NTU							
					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	2.01	1.90	6.01	65.7	92.0	11.1	249
Outflow Conc	1.27	1.26	6.55	1.45	81.2	1.72	15.0
Change	-36.8%	-33.7%	+9.0%	-97.8%	-11.7%	-84.5%	-94%

$$\%\ Change = 1 - \left(\frac{Outflow\,Conc}{Inflow\,Conc} \right) \times 100$$

Parameter Analyzed: Total Suspended Solids mg/L							
					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	9.00	8.0	8.0	216	144	43.0	588
Outflow Conc	7.00	8.0	10.0	ND	74	ND	22.0
Change	-22.2%	No change	+25%	-100%	-48.6%	-100%	-96.3%

$$\%\ Change = 1 - \left(\frac{Outflow\,Conc}{Inflow\,Conc} \right) \times 100$$

Parameter Analyzed: Fecal Coliforms (MPN/100 mL)							
					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	30,000	9,000	>160,000	----	16,000	>160,000	>16,000
Outflow Conc	>23.0	34.0	500	300	16,000	>160,000	800
Change	-99.9%	-99.6%	-99.7%	----	No change	No change	-95%

$$\%\ Change = 1 - \left(\frac{Outflow\ Conc}{Inflow\ Conc} \right) \times 100$$

Parameter Analyzed: Total Coliforms (MPN/100 mL)

					*Wet Weather Event		
	07/31/2007	**08/24/2007**	**09/18/2007**	**10/29/2007**	**11/30/2007***	**12/14/2007**	**01/04/2008***
Influent Conc	30,000	160,000	7,160,000	----	>160,000	>160,000	>16,000
Outflow Conc	>230	34.0	900	300	>160,000	>160,000	16,000
Change	-99.9%	-99.98%	-99.4%	----	No change	No change	Small Change

$$\%\ Change = 1 - \left(\frac{Outflow Conc}{Inflow Conc} \right) \times 100$$

City of
Santa Monica

Climate Today
Present Tomorrow
Santa Monica
A Sustainable Community

City of
Santa Monica

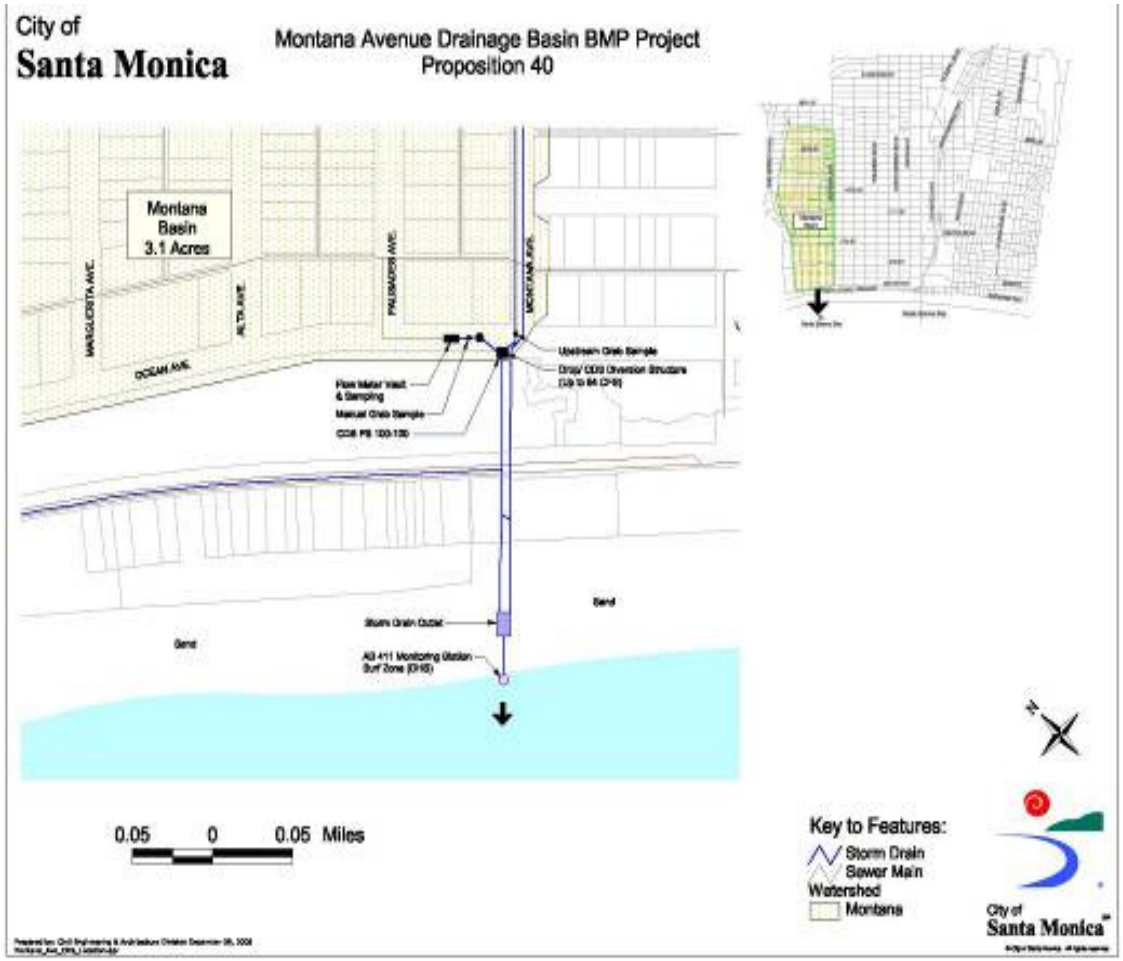
Santa Monica

Westside Water Quality Treatment Project

Treated Effluent

City of Santa Monica

Montana Dry-Wet Weather Treatment Project



City of
Santa Monica

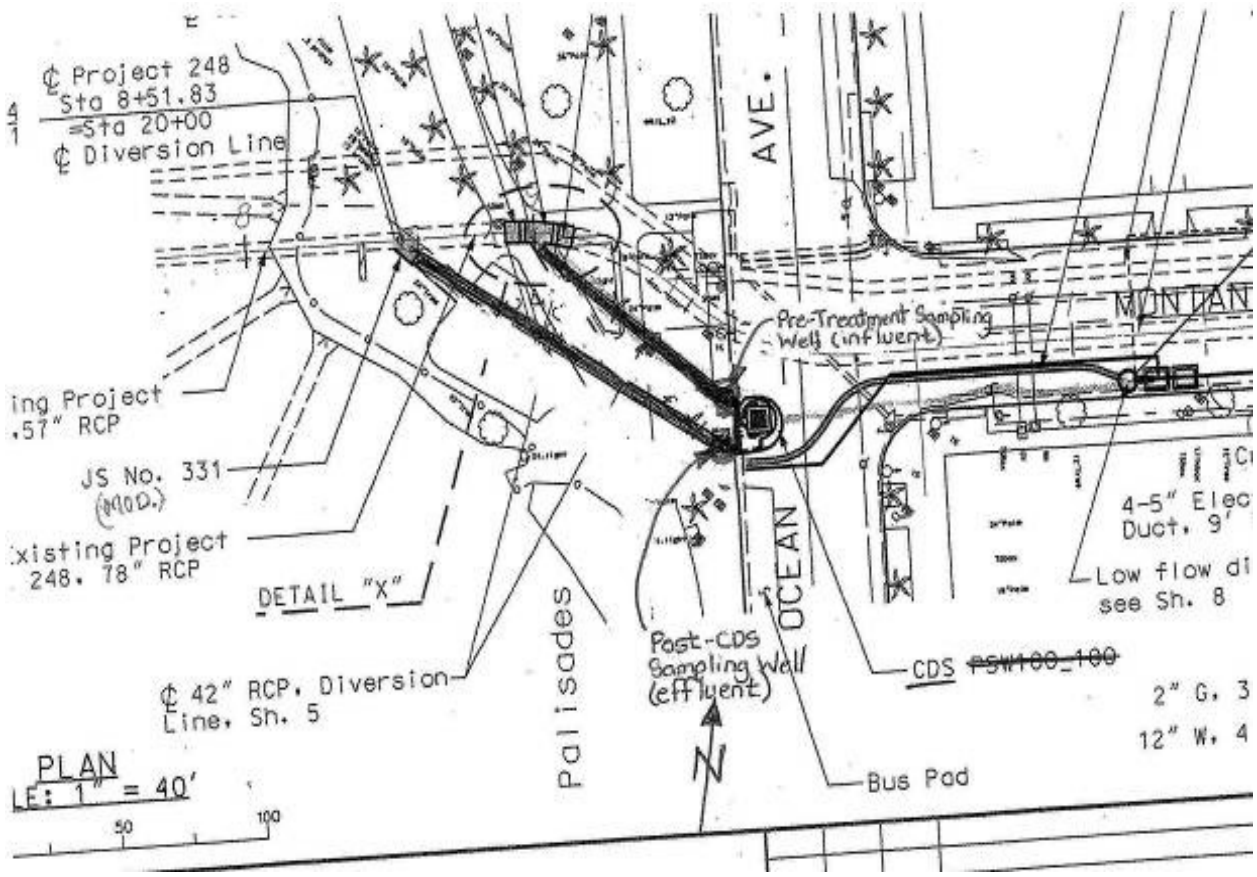
Conserve Today
Preserve Tomorrow
Santa Monica

Aerial of Project Site

City of Santa Monica

Sustainable Santa Monica

Project Design



City of Santa Monica

Sustainable Santa Monica

Pre-Construction

City of Santa Monica

Concerns Today
Preserve Tomorrow
Santa Monica

Post-Construction

Montana/Ocean Avenues Intersection – Project site

CDS vault covers in back of intersection near curb

City of Santa Monica

Montana Dry-Wet Weather Treatment Project

Specific Project Objective:

Design and construct a large state-of-the-art urban runoff treatment system capable of diverting all dry weather flow (1 cfs) and treating wet weather stormwater runoff for the design storm event (0.75 inches in 24 hours = 60 cfs) from the 600 acre Montana Avenue sub-watershed.

City of Santa Monica

Conserve Today Preserve Tomorrow Santa Monica

Montana Project Schedule

Design Phase	January, 2002 – Fall, 2005
Advertise for Bids	March-April, 2006
Construction Phase	August, 2006 – June, 2007
Project Closeout / In Service	July, 2007

Construction – Overview

City of Santa Monica

Connect Today. Preserve Tomorrow. Santa Monica

Construction – Diversion Box

City of Santa Monica

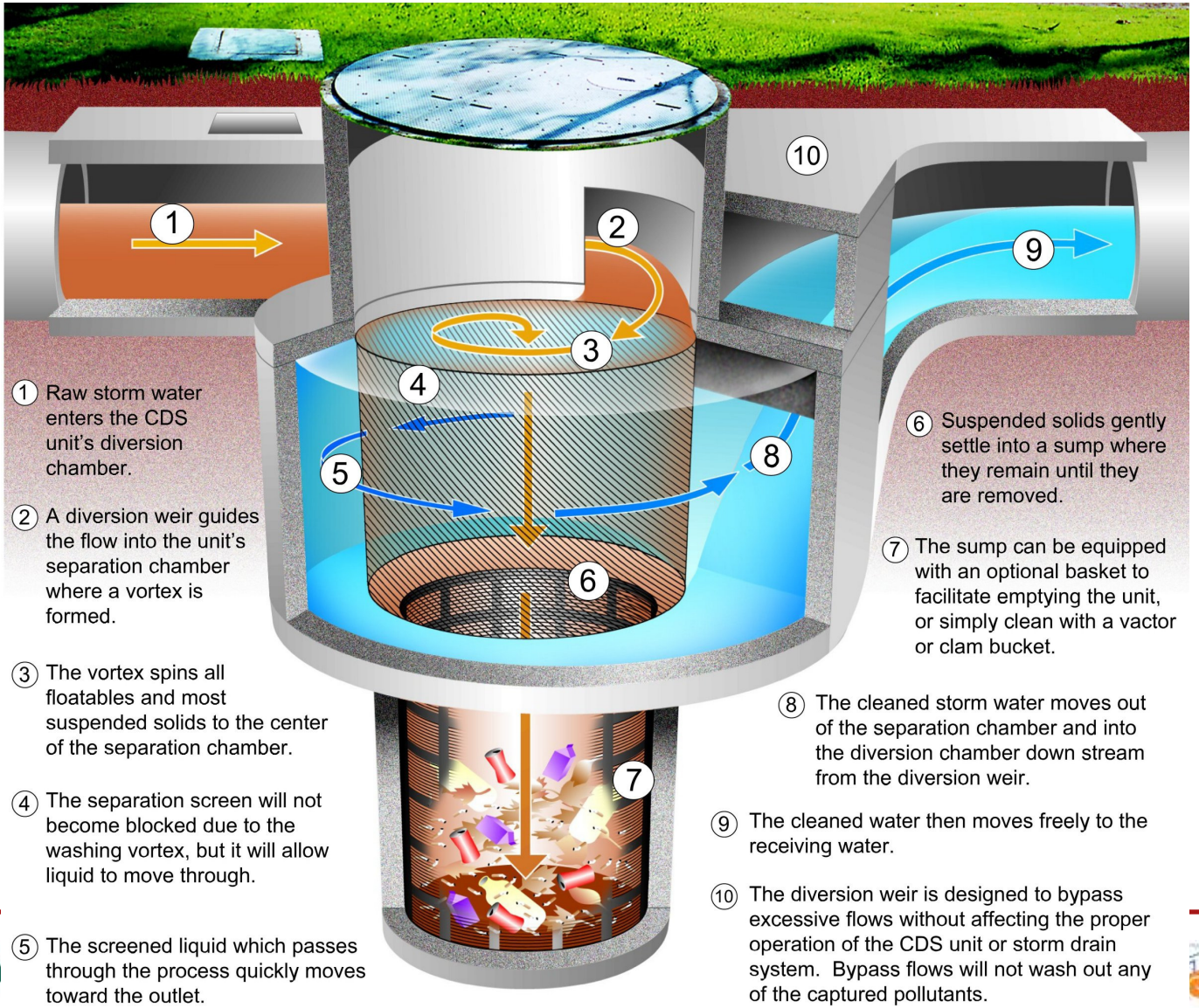
Conserve Today
Preserve Tomorrow
Santa Monica
A Sustainable Community

Construction – CDS

Micro-drilling – return line back to main storm drain

Micro-drilling machine

Montana Dry-Wet Weather Treatment Project



1. Raw storm water enters the CDS unit's diversion chamber.

2. A diversion weir guides the flow into the unit's separation chamber where a vortex is formed.

3. The vortex spins all floatables and most suspended solids to the center of the separation chamber.

4. The separation screen will not become blocked due to the washing vortex, but it will allow liquid to move through.

5. The screened liquid which passes through the process quickly moves toward the outlet.

6. Suspended solids gently settle into a sump where they remain until they are removed.

7. The sump can be equipped with an optional basket to facilitate emptying the unit, or simply clean with a vactor or clam bucket.

8. The cleaned storm water moves out of the separation chamber and into the diversion chamber down stream from the diversion weir.

9. The cleaned water then moves freely to the receiving water.

10. The diversion weir is designed to bypass excessive flows without affecting the proper operation of the CDS unit or storm drain system. Bypass flows will not wash out any of the captured pollutants.

City of Santa Monica

Construction – CDS

ation

Mid-section influent/effluent pipes on right, wet well pipe, below

Lower CDS Section

City of Santa Monica

Construction – CDS

CDS Top of Main Unit

Construction – CDS ation

Inside the CDS looking up, screening chamber, above influent door from main line

Opening where runoff rises from below and enters a pipe on other side to the wet well

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Construction – Monitoring

ts (Left) Sampling ports, influent (to right of CDS) and effluent (wet weather only,

City of Santa Monica

Construction – Pump Vaults

2 Pump Vaults in forefront, Wet Well in background

City of Santa Monica

Sustainable Santa Monica

Wet Well & SS Connection

Pumping water out of Wet Well, right, into the sanitary sewer (bottom)

City of Santa Monica

Conserve Today
Preserve Tomorrow
Santa Monica

Post-Construction

Sampling Dry Weather Influent - CDS

City of Santa Monica

Conserve Today
Preserve Tomorrow
Santa Monica

Post-Construction

Sampling Dry Weather Effluent – Pump Vault

City of
Santa Monica

Water Quality Results – General Minerals

Date	Dry or Wet	Influent or Effluent	Total Alkalinity	Chloride	Conductivity	Hardness	pH	TDS	TSS
09/05/2007	D	I	135	108	740	176	7.69	524	10
09/12/2007	D	E	144	246	1,230	216	7.39	840	ND
11/14/2007	D	E	122	120	780	160	7.33	512	17
11/30/2007	W	I	16	8.8	100	28	6.93	78	91
11/30/2007	W	E	32	12.7	182	40	6.87	130	44
% Change			-100%	-44%	-82%	-43%	1%	-67%	52%
12/26/2007	D	I	136	276	1,290	275	7.41	855	9
01/04/2008	W	I	70	29.8	310	72	7.5	212	132
01/04/2008	W	E	86	40.6	374	84	7.14	258	87
% Change			-23%	-36%	-21%	-17%	5%	-22%	34%

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results - Metals

Date	Dry or Wet	Influent or Effluent	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
09/05/2007	D	I	3.35	0.3	8.65	24.4	1.74	ND	6.6	3.63	0.95	74.5
09/12/2007	D	E	6.6	0.12	1.14	46.2	17.7	ND	5.95	3.05	0.64	64
11/14/2007	D	E	2.17	0.05	1.19	17	1.76	ND	6.95	1.58	ND	38.9
11/30/2007	W	I	2.64	0.6	3.5	94	10.9	ND	23	1.16	0.57	283
11/30/2007	W	E	4.7	0.145	137	98	9.65	ND	69.5	1.8	0.49	282
% Change			-78%	76%	-3814%	-4%	11%		-202%	-55%	14%	0%
12/26/2007	D	I	2.25	ND	1.3	2.42	ND	ND	4.01	2.85	0.165	13.9
01/04/2008	W	I	11.7	0.33	1.71	34.8	0.83	ND	6	ND	ND	134
01/04/2008	W	E	12.7	0.53	1.8	38.9	2.59	ND	5.8	ND	ND	142
% Change			-9%	-61%	-5%	-12%	-212%		3%			-6%

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results - Organics

Date	Dry or Wet	Influent or Effluent	Semi-VOC in Drinking Water			Chlorinated		Volatile	Organic	Cmpds		PAHs
			Bis (2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethyl phthalate	Pesticides/PCBs	Herbicides Dalapon	p-Isopropyltoluene	Toluene	4-Methyl 2-pentanone	MEK 2-Butamone	
09/05/2007	D	I	ND	16	ND	ND	ND	ND	ND		ND	ND
09/12/2007	D	E	3.4	ND	ND	ND	ND	ND	ND		ND	ND
11/14/2007	D	E	3.1	ND	ND	ND	ND	2.57	3.88		ND	ND
11/30/2007	W	I	10	ND	ND	ND	ND	ND	ND		ND	ND
11/30/2007	W	E	4.8	ND	ND	ND	ND	ND	ND		ND	ND
			52%									
12/26/2007	D	I	3.8	ND	11	ND	0.4	ND	ND		ND	ND
01/04/2008	W	I	3.2	ND	ND	ND	ND	ND	0.56	1.82	2.1	ND
01/04/2008	W	E	3.7	ND	ND	ND	ND	2.03	17.1	1.54	1.71	ND
			-16%						-2954%	15%	19%	

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results – Misc.

Date	Dry or Wet	Influent or Effluent	Turbidity	Color	Oil Grease
09/05/2007	D	I	5.91	92	ND
09/12/2007	D	E	4.28	72	ND
11/14/2007	D	E	3.55	60	ND
11/30/2007	W	I	29.2	87	ND
11/30/2007	W	E	45.3	105	ND
% Change			-55%	-21%	
12/26/2007	D	I	7.5	77	ND
01/04/2008	W	I	82.3	146	5.2
01/04/2008	W	E	73.2	140	4.8
% Change			11%	4%	8%

City of Santa Monica

Conserve Today Preserve Tomorrow Santa Monica

Water Quality Results Issues

Initial sampling problems first several months:

- ❑ Initially, pumps not working regularly resulting in standing water that goes septic. Cannot sample effluent.
- ❑ Very minimal low flow influent; difficult to grab sample through existing monitoring port or from the storm drain line.
- ❑ Wet weather flows so high, sampler is lost in system.

Water Quality Results - Bacteria

Date	Dry or Wet	Influent or Effluent	Coliform total	Coliform fecal	Fecal Enterococci
09/05/2007	D	I	>160,000	>160,000	ND
09/12/2007	D	E	>160,000	>160,000	ND
11/14/2007	D	E	>160,000	>160,000	ND
11/30/2007	W	I	>160,000	>160,000	>16,000
11/30/2007	W	E	>160,000	>160,000	>16,000
12/26/2007	D	I	>160,000	>3,000	ND
01/04/2008	W	I	>16,000	>16,000	ND
01/04/2008	W	E	>16,000	>16,000	2

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results – Bacterial Exceedances

SANTA MONICA BAY BEACHES BACTERIAL TMDL
ANNUAL SUMMARIES
STATION SMB-3-1 (OLD DHS 104)
Montana Ave stormdrain, Santa Monica

	DRY WEATHER							WET WEATHER						
	EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean			EXCEEDANCES - Single Day Sample				EXCEEDANCES - 30-Day Geometric Mean		
	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus	Total Coliform	Escherichia coli	Entero-coccus	Total (+) Coliform	Total Coliform	Escherichia coli	Entero-coccus
	'(MPN/100ml)				'(MPN/100ml)			'(MPN/100ml)				'(MPN/100ml)		
2005	3	2	6	1	5	0	7	2	2	2	1	0	0	8
2006	0	5	11	0	0	0	69	1	1	3	0	0	0	12
2007	0	1	8	0	0	0	43	0	0	0	1	0	0	18
2008 (thru Feb)	0	0	0	0	0	0	10	1	0	4	0	0	0	6
Totals	3	8	25	1	5	0	129	4	3	9	2	0	0	44
Pre-Construction	3	7	21	1	5	0	100	3	3	5	1	0	0	27
Post-Construction	0	1	4	0	0	0	29	1	0	4	1	0	0	17
Totals	3	8	25	1	5	0	129	4	3	9	2	0	0	44
Percent Improvement or Percent Reduction in Postings	100%	88%	81%	100%	100%	0%	71%	67%	100%	20%	0%	0%	0%	37%

Jan-March 2005 end of El Nino heavy rain year
2005-06 rain season about normal
2006-07 rain season driest in recorded history
2007-08 rain season normal '07, Jan/Feb '08, then dry
Dec 2007 entire month 30 day mean exceedances - without this post-construction exceedances significantly lower

WISARD - Legal TMDL - SMBB Bacteria (DHS)

Legend: # - Indicates accelerated monitoring required for weekly sampling
* - Ratio of E.coli-to-Total Coliform is greater than 0.1
+ - If ratio of E.coli-to-Total Coliform is > 0.1 and Total Coliform limit = 1000
' - Dry-Weather 30-day geometric mean - Wet-Weather days excluded
AE - Analyst Error
IA - Inaccessible
NC - Not Calculable
NS - Not Sampled

Summer-Dry compliance to be achieved by July 15, 2006
Winter-Dry compliance to be achieved by July 15, 2009
Wet-Weather compliance date 10-18 years from July 15, 2003

Summer-Dry Season: April 1 - October 31
Winter-Dry Season: November 1 - March 31
Wet-Weather: Rainfall >= 0.1 inches and 3 days following

Allowable Single-Sample Exceedance Days:
0 per year Summer-Dry Weather
1 per year Winter-Dry weather
3 per year during Wet-Weather

Allowable Geometric Mean Exceedance Days:
0 per year Summer-Dry Weather
0 per year Winter-Dry Weather

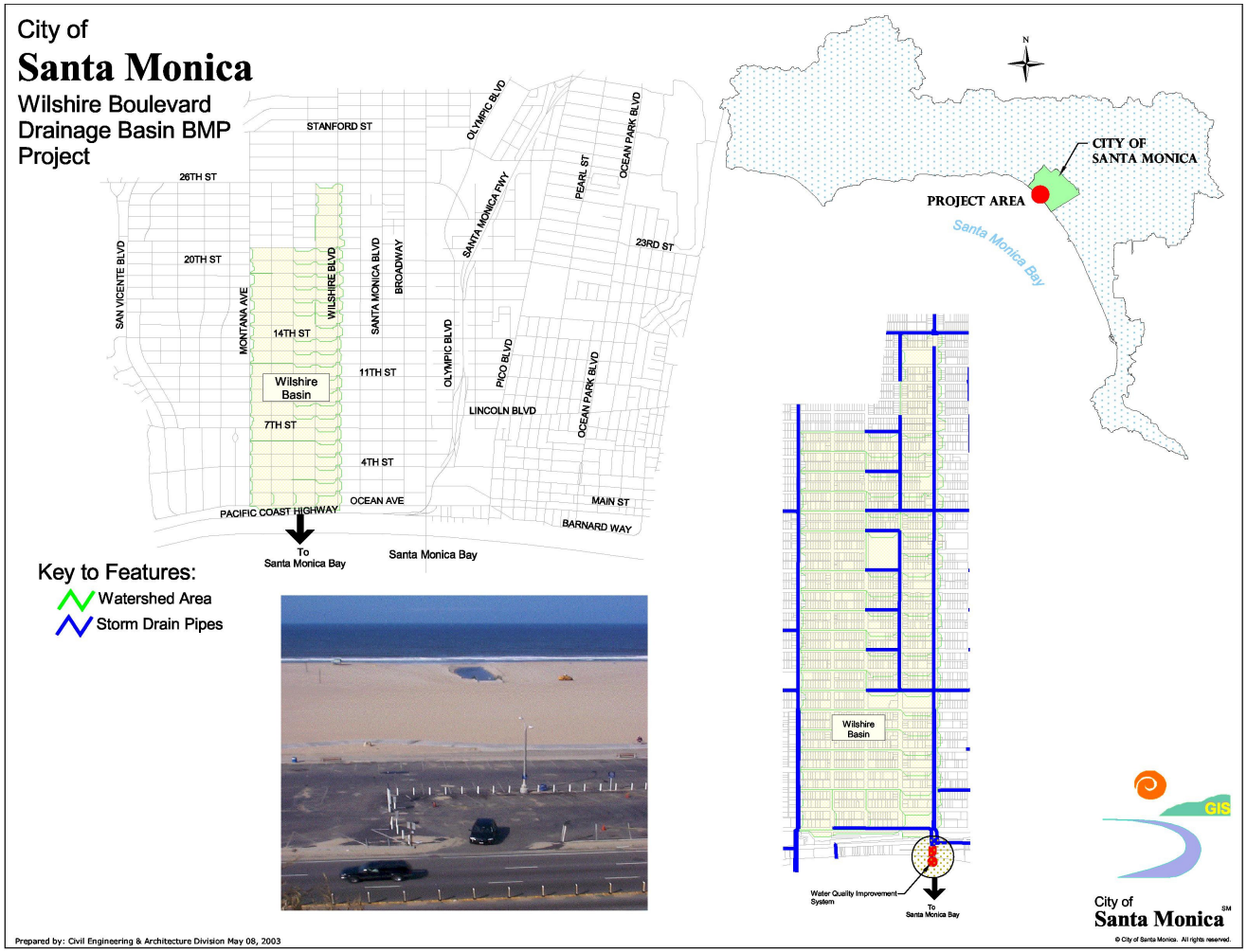
City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Post-Construction – Beach Outlet

Montana beach outlet: above, normal situation BEFORE project; left, normal situation AFTER project

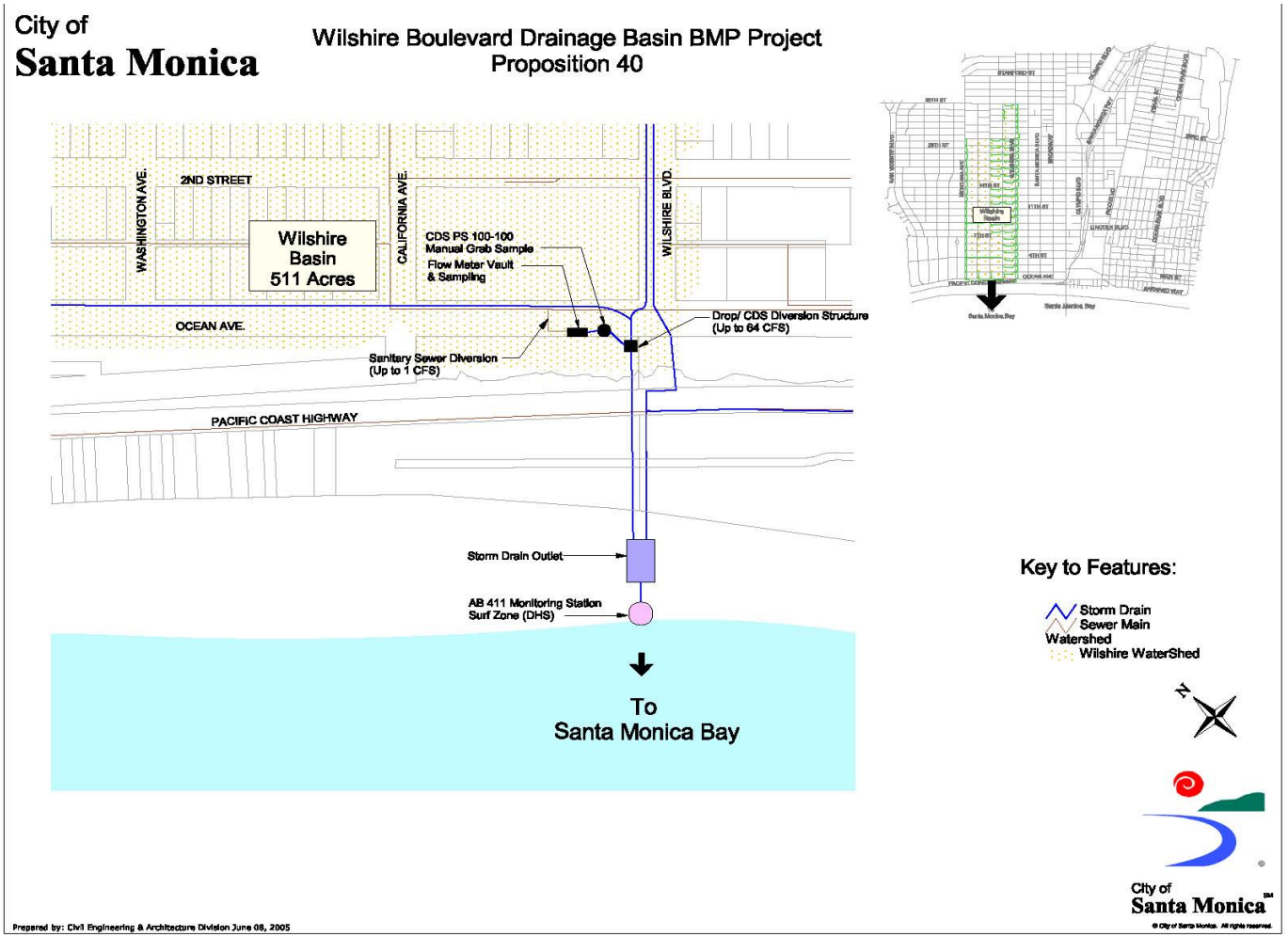
Wilshire Dry-Wet Weather Treatment Project



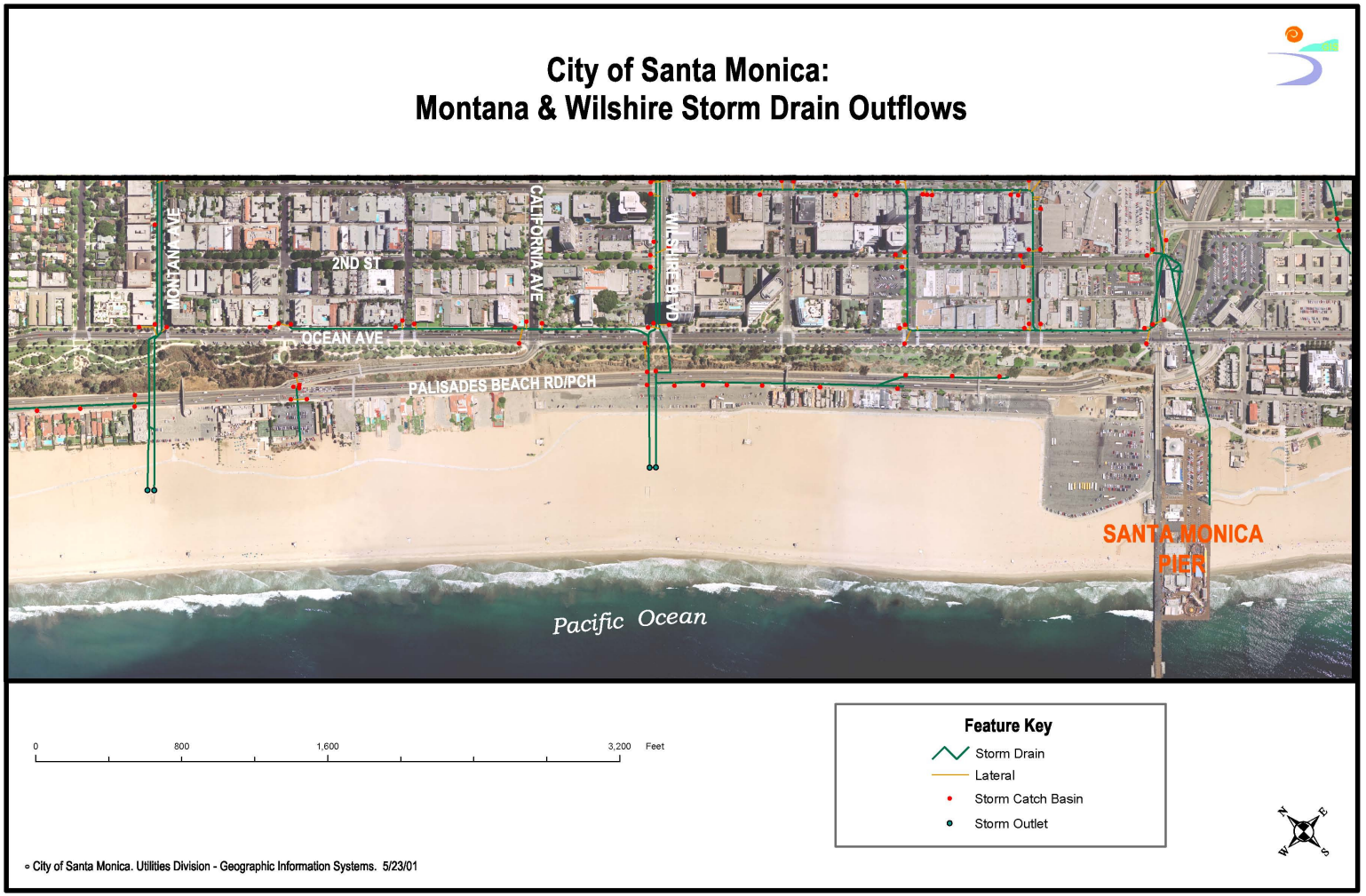
City of Santa Monica

Concerns Today
Preserve Tomorrow
Santa Monica

Wilshire Dry-Wet Weather Treatment Project



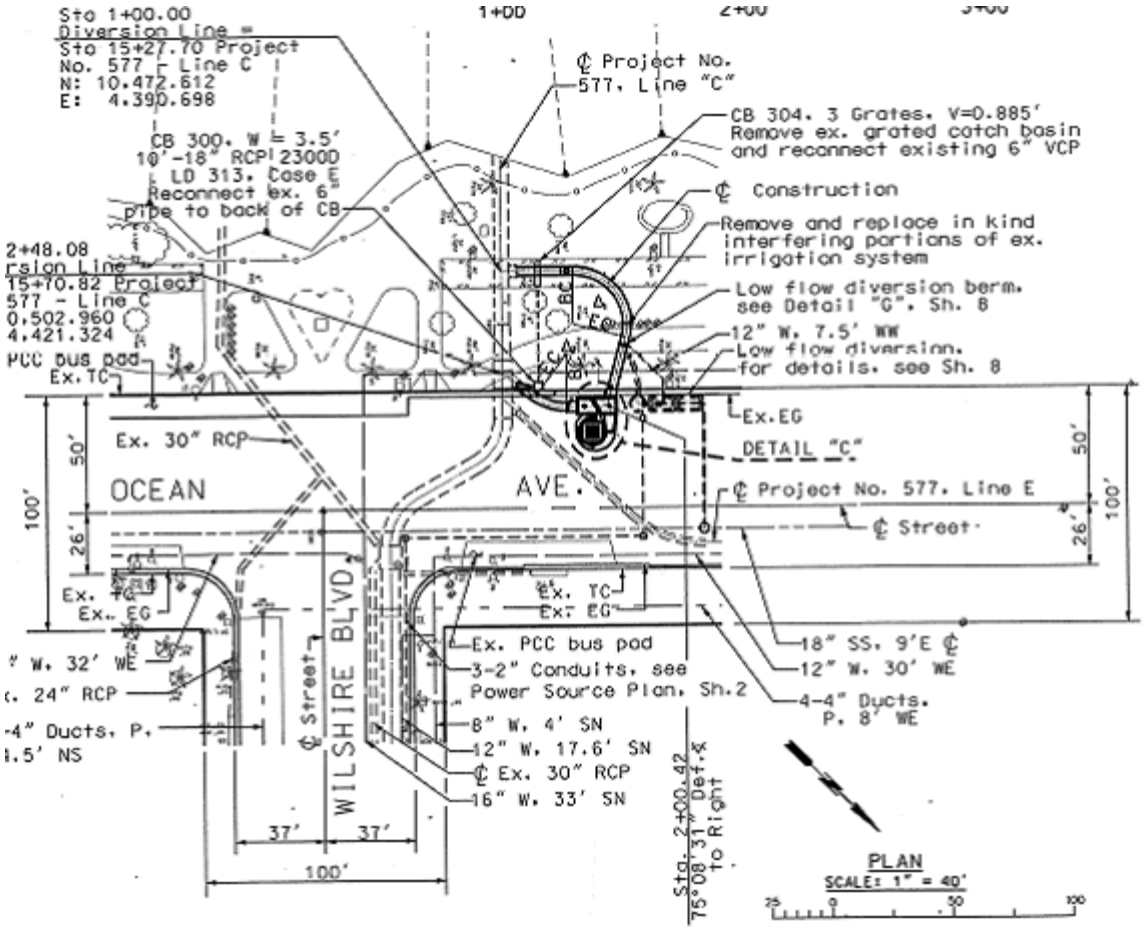
Aerial of Project Site



City of Santa Monica

Sustainable Santa Monica

Project Design



City of Santa Monica

Conserve Today
Preserve Tomorrow
Santa Monica

Wilshire Dry-Wet Weather Treatment Project

Specific Project Objective:

Design and construct a large state-of-the-art urban runoff treatment system capable of diverting all dry weather flow (1 cfs) and treating wet weather stormwater runoff for the design storm event (0.75 inches in 24 hours = 60 cfs) from the 600 acre Wilshire Blvd. sub-watershed.

City of Santa Monica

Santa Monica

Wilshire Project Schedule

Design Phase	January, 2002 – Fall, 2005
Advertise for Bids	March - April, 2006
Construction Phase	April – December, 2007
Project Closeout / In Service	January, 2008

City of Santa Monica

Concerns Today Preserved Tomorrow Santa Monica

Water Quality Results – Bacteria

Date	Dry or Wet	Influent or Effluent	Coliform total	Coliform fecal	Fecal Enterococci
01/23/2008	W	I	>160,000	>160,000	ND
01/23/2008	W	E	>160,000	>160,000	ND
02/20/2008	W	I	1,601	1,601	ND
02/20/2008	W	E	130	130	ND
% Change			92%	92%	
03/24/2008	D	I	50000	800	ND
03/24/2008	D	E	30000	800	ND
% Change			40%	0%	

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results – General Minerals

Date	Dry or Wet	Influent or Effluent	Total Alkalinity	Chloride	Conductivity	Hardness	pH	TDS	TSS
01/23/2008	W	I	30	7.2	106	25	7.72	69	120
01/23/2008	W	E	20	3.28	66	22	7.52	43	150
% Change			33%	54%	38%	12%	3%	38%	-25%
02/20/2008	W	I	52	44	366	94	7.42	242	28
02/20/2008	W	E	42	22	224	54	7.11	148	19
% Change			19%	50%	39%	43%	4%	39%	32%
03/24/2008	D	I	136	156	970	190	7.85	700	117
03/24/2008	D	E	150	260	1300	200	7.24	950	14
% Change			-10%	-67%	-34%	-5%	8%	-36%	88%

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results – Metals

Date	Dry or Wet	Influent or Effluent	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
01/23/2008	W	I	ND	ND	ND	0.031	ND	ND	ND	ND	ND	0.137
01/23/2008	W	E	ND	ND	ND	0.019	ND	ND	ND	ND	ND	0.1
% Change						39%						27%
02/20/2008	W	I	2.76	ND	3.62	65.5	2.58	ND	4.63	0.98	2.48	288
02/20/2008	W	E	0.655	ND	12.8	38.4	2.28	ND	8.3	ND	1.53	200
% Change			76%		-254%	41%	12%		-79%	100%	38%	31%
03/24/2008	D	I	3.32	0.345	6.6	46.6	5.6	ND	7.45	3.57	0.12	219
03/24/2008	D	E	2.72	0.085	4.12	33.9	1.1	ND	8.8	2.54	0.105	134
% Change			18%	75%	38%	27%	80%		-18%	29%	13%	39%

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results – Misc.

Date	Dry or Wet	Influent or Effluent	Turbidity	Color	Oil Grease
01/23/2008	W	I	46.2	47	8.24
01/23/2008	W	E	48.5	24	5.32
% Change			-5%	49%	35%
02/20/2008	W	I	27.2	70	4.4
02/20/2008	W	E	15.9	65	1.72
% Change			42%	7%	61%
03/24/2008	D	I	10.6	58	3.04
03/24/2008	D	E	13.1	39	2.06
% Change			-24%	33%	32%

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results – N/P

Date	Dry or Wet	Influent or Effluent	Nitrate	Nitrite	Ammonia	Ortho-phosphate
01/23/2008	W	I	0.89	0.09	0.779	0.183
01/23/2008	W	E	0.45	0.03	0.502	0.166
% Change			49%	67%	36%	9%
02/20/2008	W	I	2.5	0.2	0.556	0.22
02/20/2008	W	E	2.28	0.13	0.406	0.214
% Change			9%	35%	27%	3%
03/24/2008	D	I	1.4	0.1	0.465	0.484
03/24/2008	D	E	ND	ND	1.08	0.572
% Change			100%	100%	-132%	-18%

City of Santa Monica

Conserve Today. Preserve Tomorrow. Santa Monica

Water Quality Results – Organics

Date	Dry or Wet	Influent or Effluent	Semi-VOC in Drinking Water			Chlorinated		Volatile			Organic Cmpds			PAHs
			Bis (2-ethylhexyl) phthalate	Butyl benzyl phthalate	Diethyl phthalate	Pesticides/PCBs	Herbicides Dalapon	Chloroform	Acetone	Toluene	Total trihalomethane	MIBK 2Methyl-2-pentanone	MEK 2-Butamone	
01/23/2008	W	I	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
01/23/2008	W	E	9.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
% Change			10%											
02/20/2008	W	I	8.3	ND	ND	ND	0.99	0.846	ND	0.36	0.84	ND	1.06	ND
02/20/2008	W	E	4.2	ND	ND	ND	0.94	0.48	ND	ND	0.48	ND	ND	ND
% Change			49%				5%	43%		100%	43%		100%	
03/24/2008	D	I	9.2	ND	ND	ND	ND	ND	2.37	ND	ND	0.67	ND	ND
03/24/2008	D	E	4.4	ND	ND	ND	ND	1.63	3.45	ND	ND	ND	ND	ND
% Change			52%					-100%	-46%			100%		

City of Santa Monica

Sustainable Santa Monica

Wilshire Dry-Wet Weather Treatment Project

Before Construction

City of
Santa Monica

Wilshire Dry-Wet Weather Treatment Project

Post Construction

City of
Santa Monica

Thank

City of
Santa Monica℠

310.458.8223

neal.shapiro@smgov.net

www.smepd.org/runoff

City of
Santa Monica